STATE OF MAINE   Docket No. 2002-162
PUBLIC UTILITIES COMMISSION

                                                  February 11, 2003

MAINE PUBLIC UTILITIES COMMISSION   COMMISSION STAFF
Procedures for Conservation Program   REPORT ON THE
Planning   POTENTIAL FOR ENERGY
                                                  EFFICIENCY IN MAINE AND
                                                  RECOMMENDATIONS FOR
                                                  CONSERVATION PROGRAM
                                                  FUNDING

NOTE: Interested Persons may comment or object to the analysis or
          recommendations made by the Commission's Energy Efficiency Team
          in this Report. Such comments or objections must be in writing and
          filed with the Administrative Director of the Commission no later than
          February 24, 2003. It is expected that the Commission will consider
          the analysis and recommendations contained in this Report at their
          Deliberative Session on March 3, 2003.

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Executive Summary

Review of the studies and comments in this proceeding shows that the estimated

maximum <u>technical potential</u>[1] for electric energy efficiency in Maine over the next

decade is 1.8-2.2 million MWh/yr. The corresponding estimated maximum

<u>achievable potential</u>[2] is 1.2-1.6 million MWh/yr. These figures represent annual

savings level estimates possible by 2012. Both of these ranges are bounded on

the high side by the estimates provided in the studies filed by the Public

Advocate, and on the low side by staff's analysis of the specific comments

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[1] Technical potential represents the maximum savings that could be realized if everyone pursued
all technically feasible energy efficiency opportunities in all markets and end uses.
[2] Achievable potential indicates the savings that could be realized if aggressive market
intervention strategies are applied. It includes such factors as estimated market penetration rates
and market saturation rates. Maximum achievable potential indicates the savings that could be
achieved if budgetary constraints are not a factor.

provided by other parties. While there may be some room for adjustment in the analyses of energy efficiency potential, the estimated range of technical potential is 10-12 times, and achievable potential is 6-8 times, the savings that could be achieved if programs were funded at the maximum level allowed by the Conservation Act.

There is sufficient electric energy efficiency potential currently existing in the State to set assessment levels for all utilities at 1.5 mils/kWh, the maximum limit established by the Legislature. However, other considerations, primarily rate impacts, may warrant a multi-year approach that ramps into higher funding levels. For those utilities currently being assessed at the minimum level, a move to the maximum funding level would increase total electric rates by about 1.3%. Since CMP is already at the maximum funding level, this would represent no change for CMP customers.   Based on the savings projections and the cost effectiveness analysis, a ramped approach would provide most of the benefits of a maximum funding approach, while permitting a phase-in of funding increases for those utilities currently at the minimum level. If the Commission believes a ramped approach is necessary, they should adopt an approach which would continue the assessment for CMP at the current 1.5 mils/kWh, and set the funding level for the other utilities at 0.6 mils/kWh, increasing this level by 0.2-0.3 mils/kWh annually. This will bring the other utilities to the maximum funding limit in 3-6 years, as suggested by OPA.

Background

Section 4 of P.L. 2002, ch. 624 (the "Conservation Act" or the "Act") directs the

Maine Public Utilities Commission ("Commission") to develop and implement

energy conservation programs. Section 4 goes on to state that:

> *"4. Funding Level. The Commission shall assess transmission and distribution utilities to collect funds for conservation programs and administrative costs in accordance with this subsection. The amount of all assessments by the Commission under this subsection plus expenditures of a transmission and distribution utility associated with prior conservation efforts must result in total conservation expenditures by each transmission and distribution utility that:*
>
> > *A. Are based on the relevant characteristics of the transmission and distribution utility's service territory, including the needs of customers;*
> > *B. Do not exceed 0.15 cents per kilowatt-hour;*
> > *C. Are no less than 0.5% of the total transmission and distribution revenues of the transmission and distribution utility; and*
> > *D. Are proportionally equivalent to the total conservation expenditures of other transmission and distribution utilities, unless the Commission finds that a different amount is justified; however, any increase in an assessment on a transmission and distribution utility by the Commission must be based on factors other than the achievement of proportional equivalency."*

On July 23, 2002, the Commission issued an Order Establishing Procedure and

Schedule for Conservation Programs Implemented Pursuant to P.L. 2002, ch

624. In that Order, the Commission directed the Public Advocate and any other

interested person wishing to do so, to file studies on the economic potential for

energy efficiency in Maine. The Public Advocate filed two studies:

> ➤ "The Technical Potential for Electric Energy Conservation in Maine" by Exeter Associates, Inc. ("Exeter Study")

> ➤ The Achievable Potential for Electric Efficiency Savings in Maine" by Optimal Energy, Inc. and Vermont Energy Investment Corp. ("Optimal Study")

Interested persons were provided the opportunity to perform discovery related to these two studies, through written and oral data requests and two technical conferences. In a Procedural Order issued October 22, 2002, the Presiding Officer directed that formal comments in response to the two studies be filed by November 18, 2002. In addition, the Presiding Officer also directed that any person wishing to file comments on the issue of the proper funding level for the Commissions on-going electric energy efficiency program plan also be filed by that date.

Comments on the proper funding level were filed by: Central Maine Power, Bangor Hydro, Maine Public Service, Madison Electric Works, Madison Paper, and the Public Advocate on behalf of the Maine Energy Efficiency Coalition. CMP, BHE and MPS also filed comments on the two potential studies.

This report is intended to summarize Staff's review of the two potential studies, and recommend funding levels for the Commission's consideration.

Recommendations regarding an on-going program plan will be provided in a separate document.

Specifically, this report addresses the following key questions:

➢ What is the potential for energy efficiency in Maine in the next 10 years?

➢ To what extent does this potential vary between utilities?

➢ Within the limits set by the Legislature, what level of funding would be justified by the potential for energy efficiency?

➢ Within the limits set by the Legislature, what are reasonable funding options, and what are the resulting impacts on programs and savings?

Energy Efficiency Potential

Exeter Study:

The Exeter Study estimates the maximum technical potential for electric energy efficiency in Maine by market sector, end use, and utility. It is based on Maine market and sales data, where available, and energy efficiency potential estimates from various other locations. Exeter's overall estimates for annual energy efficiency potential technically possible by 2012 are shown in Chart 1, below.

Chart 1

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Maximum Technical Potential
Exeter Report
Annual MWh - 2012

Residential
    Low Income              89,591
    Non-low Income         396,853
    Total                  486,444

Commercial
    Small Business         432,743
    Non-Small Bus.         550,781
    Total                  983,524
Public Authorities         190,415
Industrial                 583,655

Total                    2,244,038


From Exeter Report: Tables 3.17 & 4.7
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During the review of this study by the parties, several errors in the analysis were discovered, and corrected by Exeter. Further analysis revealed additional e rrors. Most of these are due to bad cell references in Exeter's excel spreadsheets, and the fact that they did not include data for Fox Islands Electric Coop or Swans Island Electric Coop in their analysis. These errors are small, result in both increases and decreases in estimated potential, and do not substantially change the overall resulting estimate of technical potential. See Chart 2, below.

Chart 2

Maximum Technical Potential Annual MWh - 2012	Exeter Report	Adjusted
Residential		
Low Income	89,591	109,710
Non-low Income	396,853	375,761
Sub-Total	486,444	485,471
Commercial		
Small Business	432,751	416,203
Non-Small Bus.	550,773	529,713
Sub-Total	983,524	945,917
Public Authorities	190,415	187,293
Industrial	583,655	597,976
Sub-Total	1,757,594	1,731,186
Total	2,244,038	2,216,657
Ratio of Total Adjusted to Report		0.99

Based on the Exeter work, the total technical potential for energy efficiency in Maine is 2.2 million MWh/yr by 2012. Exeter's analysis breaks this estimate down into 4 major customer sectors, as shown in Chart 3, below. The Commercial sector accounts for the largest share of technical potential, followed by the Industrial and Residential sectors.

Chart 3

Maximum Technical Potential

27%
22%
8%
43%

- Residential
- Commercial
- Public Authorities
- Industrial

Maximum Technical Potential
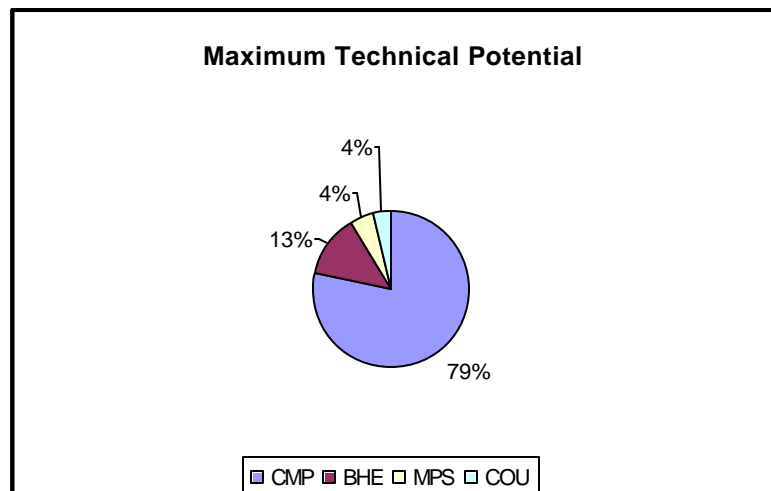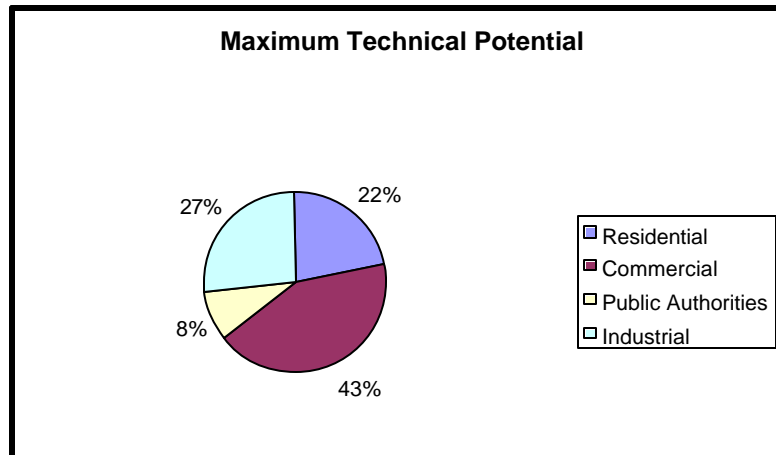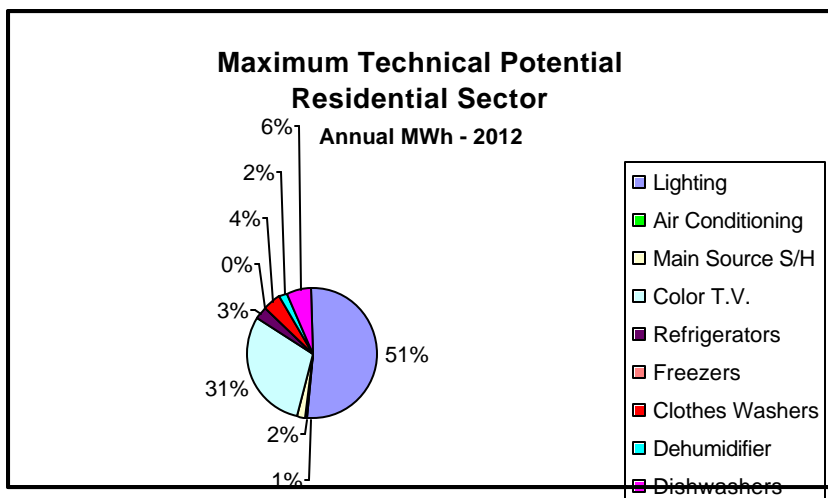
4%
4%
13%
79%

◻ CMP ◻ BHE ◻ MPS ◻ COU

Chart 4

When the estimated technical potential is analyzed by utility service territory, the

greatest share of the overall potential is in the CMP service territory. See Chart 4.

This could be expected, since CMP delivers about 78% of the kWh in the State.

In the residential sector, Exeter estimates the technical potential for energy savings in lighting, main source electric space heat, and 7 other appliances. In general, Exeter uses a "replace at end of useful life" approach to estimate the rate at which energy efficiency could be implemented for each appliance or end use. They then allocate their results into low-income and non-low income segments, based on the percentage of each utility's customers that meet low-income guidelines. As shown in Chart 5, the largest component of potential savings in the residential sector is from lighting (244,000 MWh), followed by digital color TV's (150,000 MWh). In the case of digital TV's, Exeter has assumed an accelerated replacement schedule, due to the introduction of digital broadcasting.

Chart 5

Maximum Technical Potential
Residential Sector
Annual MWh - 2012

6%
2%
4%
0%
3%
31%
2%
1%
51%

- Lighting
- Air Conditioning
- Main Source S/H
- Color T.V.
- Refrigerators
- Freezers
- Clothes Washers
- Dehumidifier
- Dishwashers

In the C&I market, Exeter estimates the technical potential for energy savings in 3 sectors: industrial, commercial, and public authority. For each of these sectors, Exeter estimates the technical savings potential for a series of broad end use efficiency measures. In both the commercial and public authority sectors, the largest component of potential savings (53%) is lighting (491,000 MWh and 97,000 MWh respectively), followed by building controls (148,000 MWh and 29,000 MWh) and variable frequency drives (VFD's) (124,000 MWh and 22,000 MWh). In the industrial sector, half the potential savings (297,000 MWh) are from VFD's, while industrial lighting accounts for 94,000 MWh.
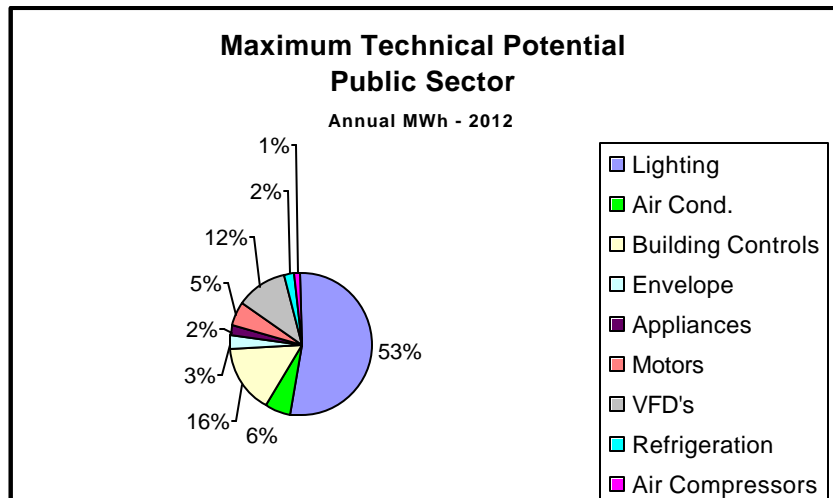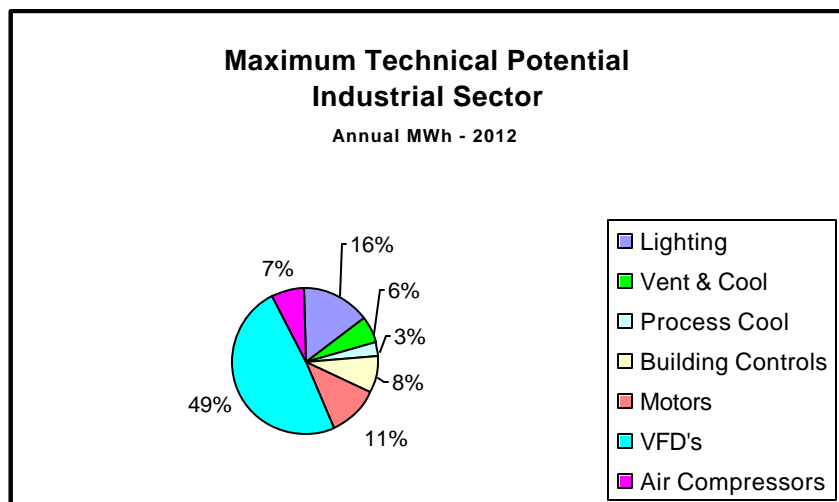

Maximum Technical Potential
Commercial Sector
Annual MWh - 2012

- Lighting
- Air Cond.
- Building Controls
- Envelope
- Appliances
- Motors
- VFD's
- Refrigeration

13% 5% 2% 2% 3% 16% 6% 53%

Chart 6

**Maximum Technical Potential
Public Sector**

Annual MWh - 2012

Legend:
- Lighting
- Air Cond.
- Building Controls
- Envelope
- Appliances
- Motors
- VFD's
- Refrigeration
- Air Compressors

Values: 1%, 2%, 12%, 5%, 2%, 3%, 16%, 6%, 53%

Chart 7

**Maximum Technical Potential
Industrial Sector**

Annual MWh - 2012

Legend:
- Lighting
- Vent & Cool
- Process Cool
- Building Controls
- Motors
- VFD's
- Air Compressors

Values: 16%, 6%, 3%, 8%, 11%, 49%, 7%

Chart 8

Optimal Study

The Optimal Study is an analysis of <u>achievable</u> electric energy efficiency potential. Optimal and VEIC developed estimates of achievable market penetration rates and associated program costs, and applied them to Exeter's estimates of technical potential. They also developed original estimates for savings and costs for residential new construction and low-income programs, two markets not explicitly addressed by Exeter. The result is a projection of annual electric savings achievable for each major residential and non-residential market over the next ten years, compiled by sector, program, and utility. Since the Optimal Study is based to some extent on the results of Exeter's work, it is affected by the small adjustments discussed above.

Optimal projects achievable potential at 3 funding level scenarios:

> ➤ A Maximum Achievable Potential (Max) case, which represents that
>   potential that could be achieved if there were no funding constraints. In
>   this case, program funding rises from $32 million on 2003 to just over
> $100 million in 2012.
> ➤ A $15 million case that has a funding level averaging $15 million over
>   the next decade. This case is intended to represent the potential that
>   could be achieved with funding at the current legislated cap.

➢ A $5 million case, which is intended to represent achievable potential
   with funding at the current legislated floor.

For each case, Optimal projects market penetration rates and program costs.
Optimal also estimates the economic impacts of each scenario, calculating future
benefits based on avoided cost estimates, and discounting benefits and costs to
2003 at a real discount rate of 2.4%.

At the three funding levels analyzed by Optimal ("Max, $15M and $5M"), the
achievable energy savings in 2012 are 73%, 12%, and 4% of the technical
potential estimated by Exeter ("Tech") , as shown in Chart 9, below.
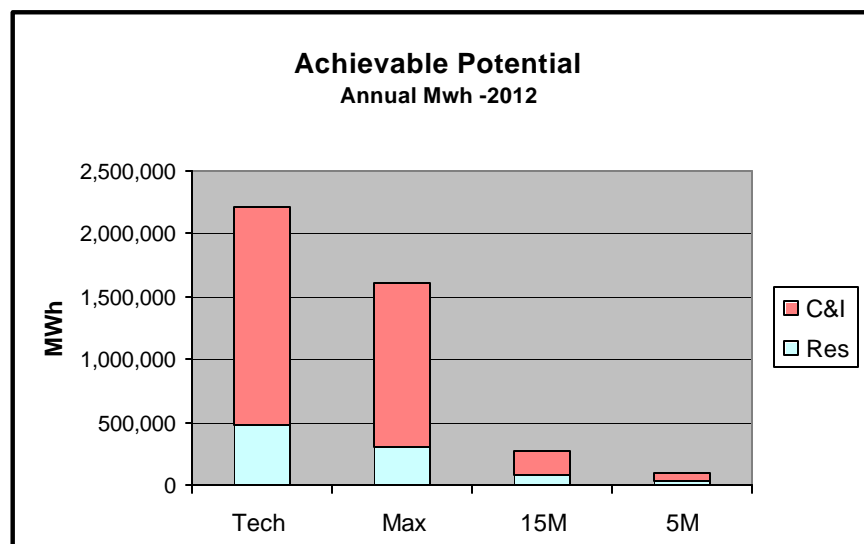
Chart 9

Chart 10 shows the cost effectiveness of the three Optimal cases[3]. All cases are

cost effective. The Max case would yield a net benefit[4] of just over $500 million.

The two restricted funding cases yield net benefits of $57 million and $18 million,

respectively.

Chart 10

	NPV Benefit	NPV Cost	Net Benefit	Benefit/Cost Ratio
Optimal Achievable Potential Study				
Cost Effectiveness Comparison				
Net Present Value 2003-2012				
$ millions				
OPT Max	$1,235	$727	$508	1.70
OPT 15M	$207	$150	$57	1.38
OPT 5M	$67	$49	$18	1.37

Although Optimal's $15 million and $5 million scenarios are intended to reflect

the current maximum and minimum funding levels allowed by the Act, they don't

include an adjustment for amortization of past Power Partners commitments.

Subtracting the funds that would be used to pay for Power Partners, Maine's

maximum available funding level for new programs would fall between the $15M

and $5M cases, as shown below.


[3] Including the small Exeter adjustments.
[4] NPV benefits less NPV costs, over the period 2003-2012

Chart 11

Funding Level Comparison
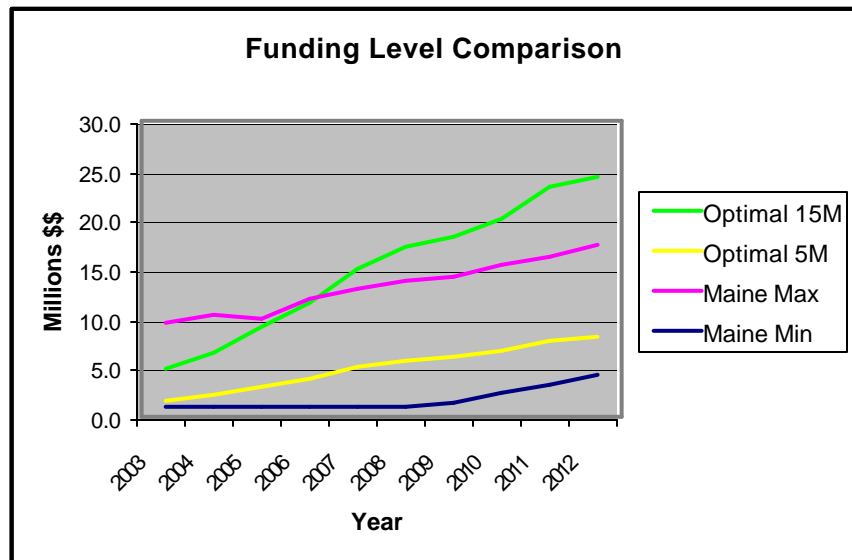
The electric load growth (annual MWH) in the state is projected at 0.7%/yr over the next decade. Overall, if the maximum potential estimated by Optimal were achieved, it would reduce load in 2012 from 108% to 94% of 2002 kWh levels.

Chart 12

Electricity Sales
Millions of MWh
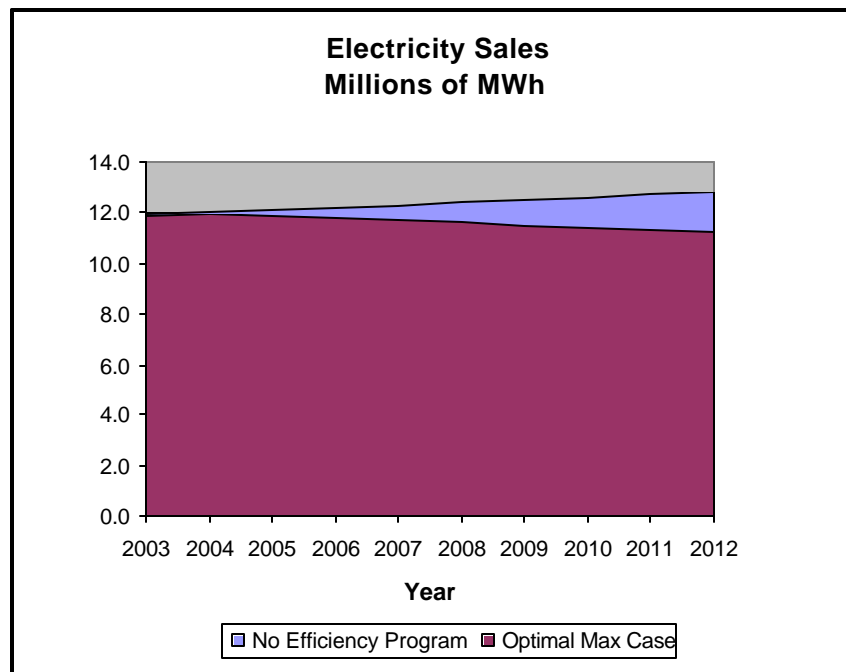
Comments on Efficiency Potential

Comments on the energy efficiency potential studies were received from CMP, BHE and MPS.

CMP asserts that Exeter has overestimated the potential for energy efficiency in Maine and has ignored Maine's past conservation efforts. CMP offers specific comments on the 2 studies:

- o CMP states that the average annual electric use per residential customer in Maine is 42% less than the national average, due to

the high price of electricity in the state and CMP's past
conservation efforts.

o Exeter has overestimated the amount of residential electric use
  associated with incandescent lamps. (CMP incorrectly asserts that
  Exeter estimated that 86% of residential electricity use was due to
  incandescent lamps. Exeter actually asserted that 86% of
  residential lighting use was due to incandescent lamps, and
  estimated this at 611 kWh/year)

o CMP states that Exeter assumed that the saturation of CFL's in
  Maine is 5%. CMP further states that the 1993 Residential Energy
  Consumption Survey for the US shows that CFL's are used in 9%
  of households and CMP's own 2001 survey of residential
  customers shows a 91% saturation. (This appears to be a
  definitional issue. Exeter is estimating a 5% market share of CFL's
  in the residential lighting market, while CMP is quoting estimates
  on the number of households that use one or more CFL's.)

o Exeter has overestimated the savings due to standby energy in
  efficient digital televisions in two ways. First, Exeter under-
  estimates average daily television use (7.05 hrs/day vs. 7.7).
  Second, Exeter overestimates the rate at which Mainers will
  replace their televisions with digital TV's (Exeter assumes a 7 year
  replacement period).

- o Exeter has overestimated the average annual energy consumption of dehumidifiers in Maine, since Maine has cooler summers and less humid weather than most regions of the country. CMP suggests that 638 kWh/yr is a more reasonable energy consumption estimate than Exeter's 1347 kWh/yr.

- o CMP comments on Exeter's assumptions regarding the saturation of residential air-conditioning in Northern and Eastern Maine, but does not offer any alternative assumptions.

- o Exeter's assumption that the average annual electric energy consumption of low income customers is wrong, and that, in Docket 2001-245, CMP, BHE, and MPS produced data showing that low income customers use about the same amount of electricity as an average residential customer.

- o In the commercial and industrial sectors, CMP states that Exeter did not take into account its past conservation efforts, and consequently underestimated the current saturation rates for various C&I end uses in it's territory. CMP offers it's own assumptions.

BHE comments that the studies represent a good start toward estimating the potential for energy conservation in Maine, but that the use of these studies should be limited to targeting specific end-uses and not for determining specific program types or funding levels. BHE further comments that, according to the

studies, the majority of the potential in the state is due to lighting and lighting programs can serve a wide variety of customers at a relatively low cost.

BHE expresses concern that some programs analyzed in the Optimal Study, particularly Residential New Construction, have significant other benefits besides electricity savings, that programs should be designed to reduce inefficient electrical use, and that any incentives awarded to participants should be limited to the level of savings attained through avoided generation and T&D delivery costs. BHE further expresses concern that the benefit cost ratios (BCR's) for BHE in the funding constrained scenarios are less than half those of the other utilities.

Finally, BHE states that electric end uses should be the primary target. Other benefits, such as sustainable economic development and reduced environmental damage, should be maximized, but are not a focus of program design.

MPS points out that there is little if any load growth in northern Maine, and that the achieving incremental savings on T&D construction is more difficult in rural areas because service must be maintained. MPS agrees that it is desirable to achieve savings in fossil fuel and water, as well as conserving electricity, and wants to emphasize that other energy providers and those that embrace the conservation of natural resources should contribute to the conservation fund.

MPS further feels that the variance between the two reports is too large and agrees with Optimal that the Commission should rely on detailed program potential analysis to design and plan its on-going programs. MPS also points out that Northern Maine is part of the Northern Maine Independent System Administrator and not ISO-NE.

Discussion

Exeter and CMP both offer differing assumptions on some parameters. To test the impact of these differences on the overall energy efficiency potential in the state, Exeter's analysis was modified to substitute almost all of CMP's assumptions. (This excludes residential lighting, where it appears CMP misinterpreted Exeter's assumptions, and air-conditioning, since CMP offered no alternative assumption and BHE and MPS did not comment on this.)

Chart 13 compares five levels of energy savings in 2012. From the left, they are: the technical potential in the State from the Exeter Study (adjusted), the technical potential using CMP's assumptions, the achievable potential in the state from Optimal's maximum scenario, the maximum achievable potential using CMP's assumptions, and the potential that could be achieved at the maximum funding level allowed by the Act. Chart 13 shows that using CMP's assumptions would reduce the overall technical potential for energy efficiency in the State through

2012 by 19%, compared to Exeter's analysis. Using CMP's assumptions would reduce the maximum achievable potential by 24%, compared to Optimal's Max Case. However, Maine can accomplish only a fraction of the achievable potential in the State over the next decade, even at the maximum funding level allowed.

Chart 13.

Potential Savings Comparison
2012 - MWh
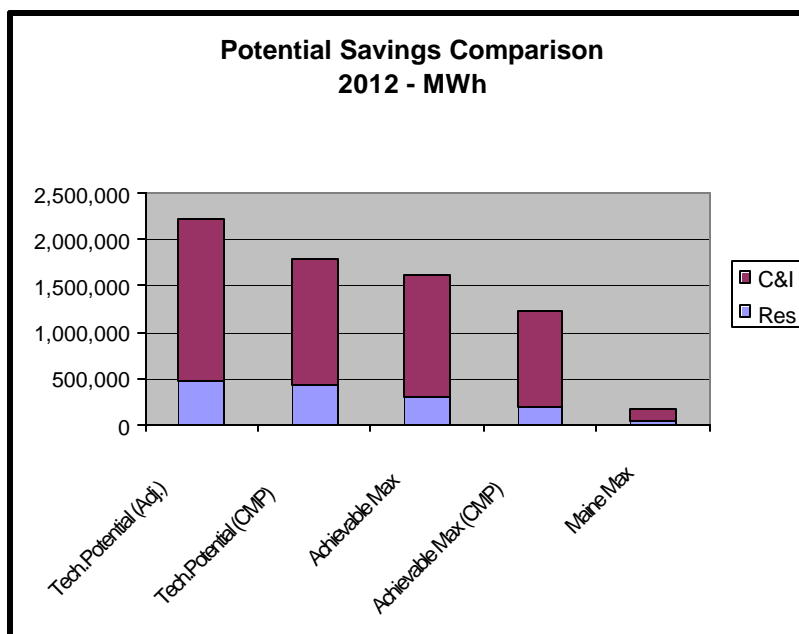
Variation Between Utilities

While there is some variation in the energy efficiency potential in specific end uses or sectors between the T&D utilities, overall, there is substantial potential for savings in all utility service territories across Maine.

The Exeter and Optimal analyses identified some differences in energy efficiency potential between utility service territories, primarily due to different load growth rates or different saturations in air conditioning. Overall, however, each utility's energy efficiency potential as a proportion of overall State potential reasonably matches the utility's share of kWh sales levels. Comparing Charts 14a & 14b, the CMP service territory accounts for the largest share of electricity sales in the State(78%) followed by BHE (13%), the consumer owned utilities (COU's- 5%), and MPS (4%). Similarly, CMP accounts for 77% of Optimal's estimated achievable potential, followed by BHE (13%), the COU's (6%) and MPS (4%).

If CMP's assumptions are used, (Chart 14c) then CMP's proportion of overall savings potential would drop to 72%. All other utilities would see a proportional increase. Even if CMP's assumptions were adopted, a substantial proportion of the State's energy efficiency potential would still be in the CMP service territory, and this potential would be sufficient to support a high level of program activity and funding for several years.
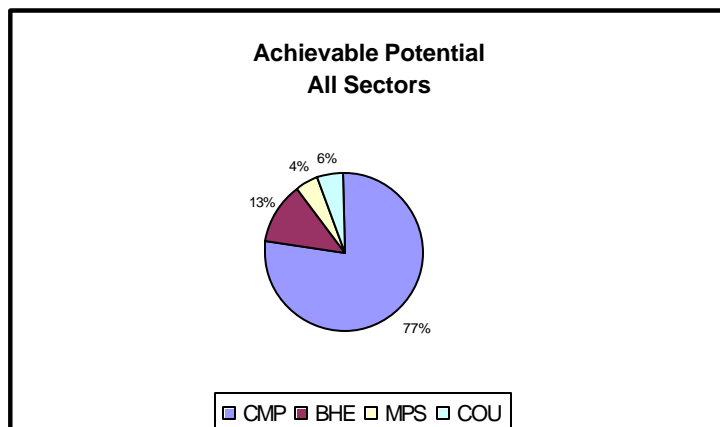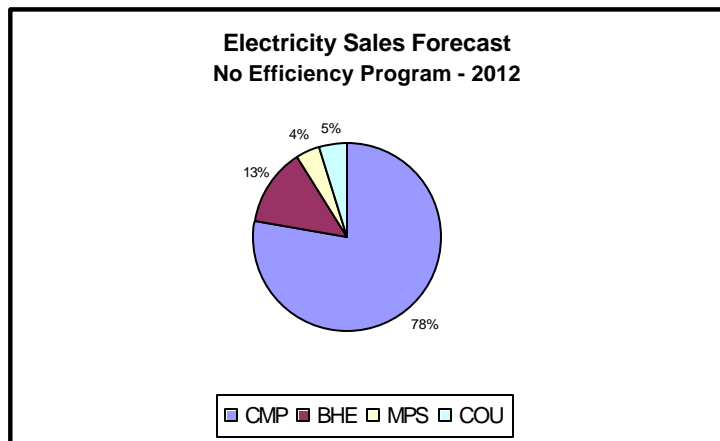
Chart 14 a

Electricity Sales Forecast
No Efficiency Program - 2012

5%
4%
13%
78%

CMP BHE MPS COU

Achievable Potential
All Sectors

6%
4%
13%
77%

CMP BHE MPS COU

Chart 14 b

Achievable Potential
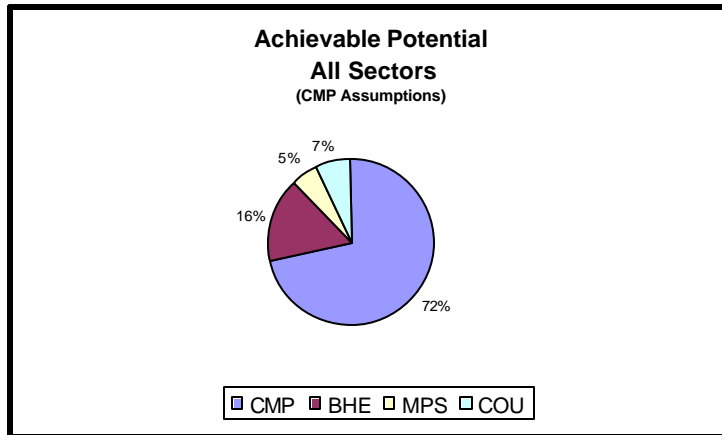**All Sectors**
(CMP Assumptions)

Chart 14c

Funding Options

At the current maximum funding limit set by the Legislature (1.5 mils/kWh), we can expect to achieve about 12% of the maximum achievable potential identified by the Optimal Study over the next decade. This is shown in Chart 15, by comparing the annual energy savings level in 2012 for Optimal's maximum achievable scenario (1.6 million MWh), with the savings level for the Maine Max case (190,000 MWh). Using CMP's estimates, the maximum achievable estimate is reduced to 1.2 million MWh, and we could expect to achieve about 16% of this amount at the current funding limit.
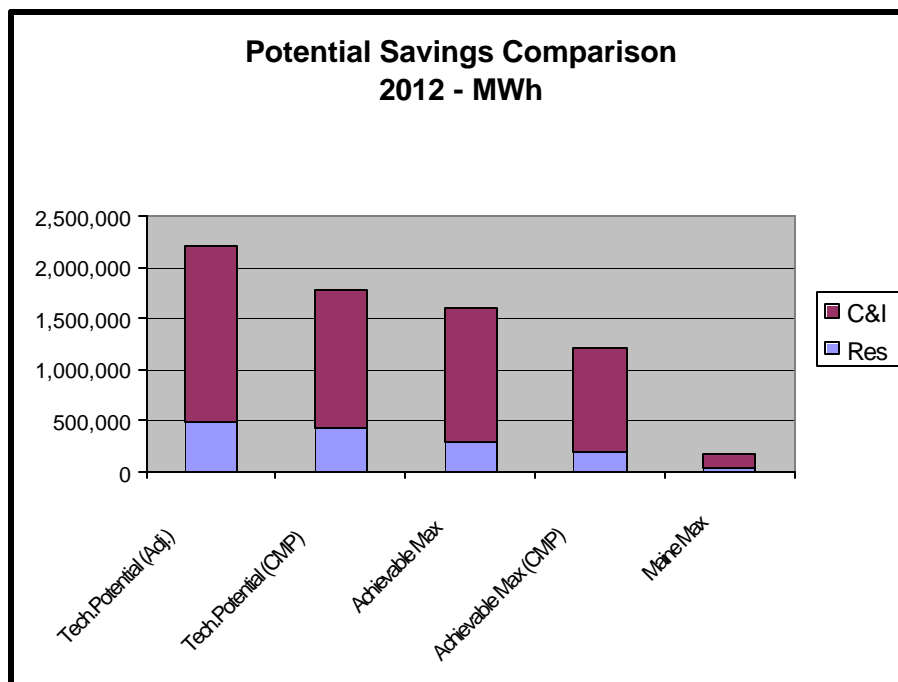

Chart 15

The Legislature has established[5] a range within which the Commission can set assessment levels for energy efficiency programs. The current minimum assessment is set at 0.5% of T&D utility revenue, and the maximum limit is set at 1.5 mils/kWh. Using the electricity sales forecast from the Exeter Report (adjusted), the estimated funds that would be available at the maximum and minimum funding levels over the next decade are shown in Chart 16. Total assessment represents the estimated assessment at the indicated level[6], summed for all Maine utilities. Subtracted from this total are utility commitments to amortize previous programs (CMP Power Partners), to yield the net amount available each year for new programs from the Energy Efficiency Fund.

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[5] PL 2002, ch. 624, Section 4

[6] For the Maine Minimum case, CMP's assessment was assumed to equal the greater of the minimum funding level or what would be required to meet their Power Partners payment. Under this assumption, CMP would not provide funds for new programs until 2009. All other utilities would be assessed at the minimum.

Chart 16

Energy Efficiency Fund
Estimated Funding Range
$ millions

Year	Maine Maximum (1.5 mils/kWh)			Maine Minimum (0.5% rev.)		
	Total Assessment	Previous Programs	Available for EE Fund	Total Assessment	Previous Programs	Available for EE Fund
2003	$16.7	$7.1	$9.6	$8.1	$7.1	$1.0
2004	$16.8	$6.6	$10.3	$7.6	$6.6	$1.0
2005	$17.0	$7.1	$9.9	$8.1	$7.1	$1.0
2006	$17.1	$5.2	$11.9	$6.3	$5.2	$1.0
2007	$17.2	$4.3	$12.9	$5.4	$4.3	$1.0
2008	$17.4	$3.6	$13.8	$4.6	$3.6	$1.1
2009	$17.5	$3.2	$14.3	$4.7	$3.2	$1.4
2010	$17.6	$2.2	$15.4	$4.7	$2.2	$2.5
2011	$17.8	$1.5	$16.3	$4.7	$1.5	$3.3
2012	$17.9	$0.6	$17.3	$4.8	$0.6	$4.2

Chart 17, below, shows five alternative energy efficiency program funding level projections through 2012. Each of these projections is net of previous Power Partners commitments. The five curves represent funding at the current level and 4 options, which were selected to represent the range of funding levels that could be adopted by the Commission. These options are presented here to facilitate Commission consideration of the funding range and the resulting program and savings implications. They should not be considered as final program recommendations.
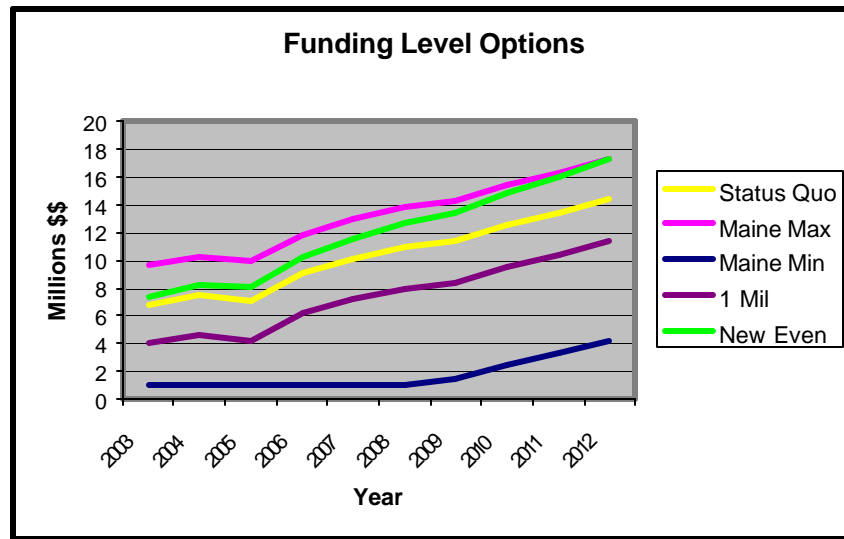
Funding Level Options

Chart 17

- <u>"Status Quo":</u> This is a projection of the funds that would be available if the current assessment levels were maintained.

- <u>"Maine Max":</u> Provides for funding at the maximum currently allowed by the Act, as suggested by the OPA, with all utilities assessed at 1.5 mils/kWh.

- <u>"Maine Min"</u> Provides for an assessment from CMP at the minimum needed to pay its previous power partners commitments (no contribution to new programs until 2009) and an assessment from all other utilities at the minimum level allowed by the Act, 0.5% of transmission and distribution revenue.

- <u>"One Mil"</u> Assesses funding from all utilities at a level of 1.0 mils/kWh, as suggested by CMP.

➢ <u>"New Even"</u> This is a funding option which continues CMP's assessment at the maximum level allowed, and sets the remaining utilities on a funding approach which starts at 0.6 mils/kWh in 2003 and ramps up at 0.1 mil/kWh annually to the maximum level. This approach results in a funding level for the remaining utilities that closely matches the net funds available from CMP for new programs after Power Partners payments are made. See Chart 18.
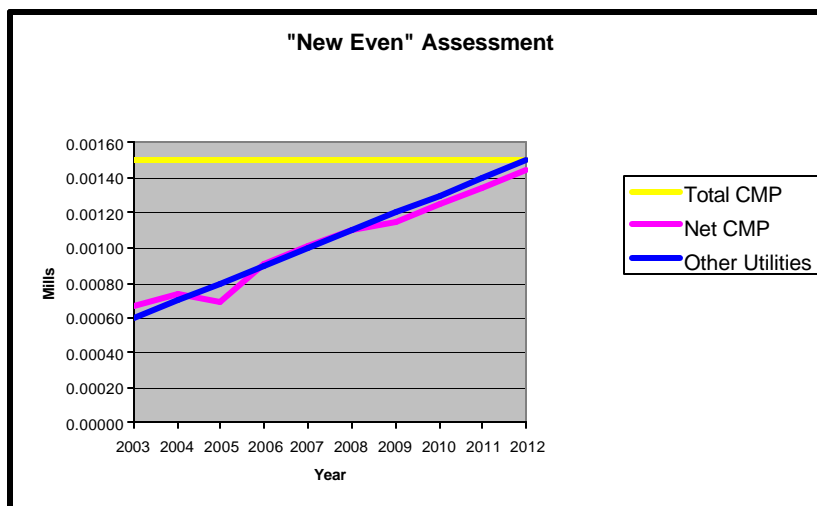

Chart 18

Using the data provided in the Exeter and Optimal Studies, staff developed estimates of annual energy savings, costs and benefits for each of the four options listed above. The maximum level of funding ("Maine Max") would allow for a reasonably robust program serving all major market sectors. The Maine Min option would severely restrict program offerings. At this level, the program would

fund only a small low-income program and a minimum small business program. The 1 Mil option is a medium level of funding between the maximum and minimum. This funding level would support a low-income program, a moderate small business program, and a residential lighting program, but large C&I programs or government /school programs would be very limited. The New Even approach would initially yield about the same funding as current assessment levels, and ramp gradually to a near maximum funding level by the end of the decade. Program offerings under this option would be similar to, but slightly smaller than the maximum option.

Estimated cumulative annual MWh savings in 2012 for each alternative are shown in Chart 19. Funding at the maximum limit would result in energy savings of 190,000 MWh/yr by 2012. In contrast, funding at the minimum level would produce only 24,000 MWh/yr of savings. At a 1 mil funding level, the estimated savings would be about half that obtainable at the maximum funding level (97,000 MWh/yr) and the New Even funding approach would result in 92% of the savings from maximum funding (174,000 MWh/yr).

Mwh Savings Options
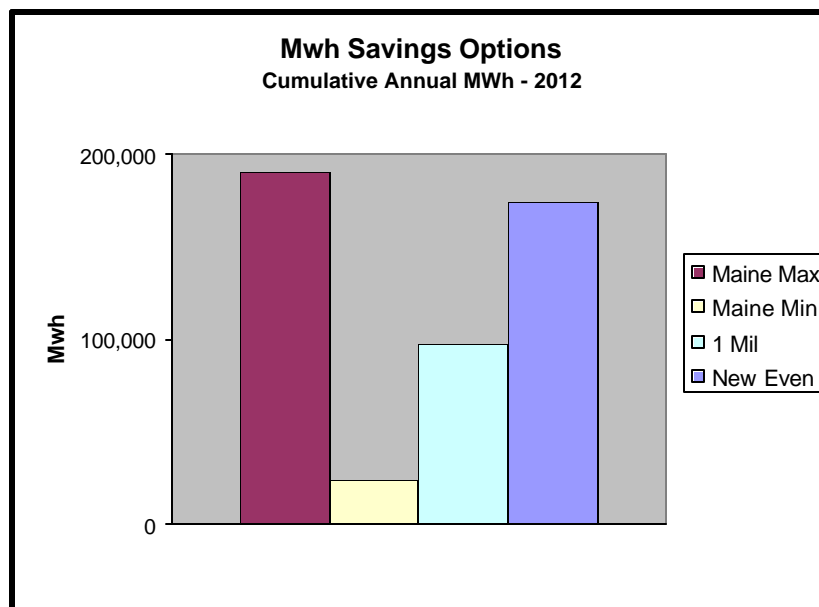**Cumulative Annual MWh - 2012**

Chart 19

The financial impacts of the four options were estimated using the cost information supplied in the Exeter and Optimal Studies, including estimates of future avoided electricity costs in Maine.

Development of Avoided Costs:

The Commission is required by law to select energy conservation programs that are cost effective in a broader societal sense. In its November 6, 2002 Order "Adopting Rule and Statement of Factual and Policy Basis" the Commission revised Chapter 380, the rule it has historically used to judge whether energy conservation programs are cost effective. The rule defines the energy savings that should be used to determine whether programs are cost effective.

Avoided electric generation costs including energy and capacity costs, using estimates of market prices and adjusting for line losses. These estimates may be differentiated by different time periods that influence market prices, including but not limited to peak and off-peak periods and summer and winter periods.

In addition to the energy and capacity savings, the transmission and distribution costs that are avoided due to increased efficiency may also be included in the estimate of savings attributable to an energy conservation program.

Avoided transmission and distribution costs, using estimates of transmission and distribution utility marginal transmission and distribution costs. These costs may be differentiated by time periods that influence costs.

Initial Estimates:

In making their estimates of the economically efficient amounts of technical and achievable energy efficiency potential, the OPA's witnesses modified avoided energy supply costs that have been accepted for use in Massachusetts, Rhode

Island, and New Hampshire[7]. These costs were based on estimates of the New England wholesale electric market's energy and capacity costs. To develop the costs, OPA's consultants used a production-costing model that simulates the least cost dispatch of New England's fleet of power plants. To account for the effect that changes in fuel price would have on generating costs, the consultants used the latest available natural gas and oil price forecasts. In order to ensure that their model was properly calibrated, the consultants calibrated the model with the latest available Natsource electricity futures information. Natsource only publishes the forward prices for three years out, and the consultants calibrated the model for consistency with those prices, then simulated system dispatch from that point forward through the year 2012. Beyond 2012, the consultants extrapolated the market energy price at the rate of escalation of the energy costs of combined cycle gas plants for 2010 to 2015. The annual escalation rate in real price was .655% over the period, and the consultants assumed that rate was sufficient for extrapolating costs beyond the study period. Capacity cost estimates were derived similarly. The consultants began with Natsource prices for installed-capacity contracts of $1.63/kW-month in 2002, and $1.53/kW month in 2003. This is equivalent to an annual price of about $18/kW-yr. From that point forward, the consultants ramped the price up to $37.8/kW-year in 2007[8]assuming that the market would reach equilibrium by then. The seasonal value of capacity was determined through observation of the 60:40 ratio of

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[7]A more through discussion of the earlier study can be found in the report itself, "Updated Avoided-Energy-Supply Costs for Demand –Side-Management Screening in New England." Prepared by Paul Chernick and Susan Geller of Resource Insight and Bruce Biewald and David White of Synapse Energy Economics.
[8] Real dollars

summer to winter capacity values observed in the market for an earlier report. A final adjustment that the consultants made was to apply a ratio of 1.2 to the wholesale prices in order to make them equivalent to the observed difference between wholesale clearing prices and the slightly higher prices that marketers in the region appear to be offering to retail load.[9]

Maine Adjustments:

The estimates of avoided costs that were generated in the earlier study were decreased by about 37% to reflect observed decreases in capacity contract prices published for 2003 and 2004. The energy supply costs were further decreased by 5% for Maine relative to the rest of New England to reflect the lower locational marginal prices for Maine that were published in ISO New England's 2001 Regional Transmission Expansion Plan. This cost reduction will make the Maine avoided cost numbers suitable for use in the northern part of Maine that is served through New Brunswick. The consultants also customized the avoided costs for line losses by using recent marginal cost studies prepared by Central Maine Power Company and Bangor Hydro Electric Company. The consultants included marginal transmission and distribution costs of about $80/kW-yr.[10]

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[9] The rationale for the observed differences included the possibility that the 20% differential includes the risk premium for serving retail load and that the production costing model has not estimated the cost of ancillary services.
[10] $80/kW-yr was the lowest estimate from a range of CMP studies reviewed and was consistent with a 1988 estimate by BHE scaled to today's dollars.

Load Shapes and Seasonal Differentiation:

The market price of power varies seasonally and from hour to hour each day. The energy efficient technologies that are being examined have varying usage from hour to hour and, like the market prices, from season to season. The variations between market price and device use must be taken into consideration when calculating the value of the energy that a particular technology may save (e.g. an air conditioner does not run often in January when market prices are low, but may be on quite frequently during the system peak when prices are high). The OPA's consultants performed these calculations by using the "load shape" data of various technologies that had been developed from an earlier study they performed in Vermont.[11]

The estimates for avoided energy costs developed by the OPA's consultants are adequate for our use. We have made a small adjustment to remove the 20% retail adder to the transmission and distribution costs that was added by the consultants because we believe that the correct values to use are the wholesale market values and not what it costs to provide the energy at retail. We will participate with agencies in MA, NH, and RI on future updates of the study consistent with the directive of 35-A M.S.R.S. §3211-A (2)(I):

> The commission may coordinate its efforts under this section with
> similar efforts in other states in the northeast region and enter into
> agreements with public agencies or other entities in or outside of
> the State for joint or cooperative conservation planning or

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[11] See OPA response to Oral Data Request Nos. 9 and 11 Docket 2002-162

conservation program delivery, if the commission finds that such coordination or agreements would provide demonstrable benefits to the citizens of the State and be consistent with this section, the conservation programs and the objectives and overall strategy for the conservation programs.

Cost Effectiveness:

The financial impacts of the four funding options are shown in Chart 20.

Funding at the maximum level over the next decade would yield a net benefit (in present value 2003 dollars) of $44 million. A minimum funding program would produce about one tenth the net benefit ($4.7 million). The 1 Mil option would yield about 44% of the net benefit ($20 million), and the New Even option 88% ($39 million) of the maximum option.

Chart 20

Cost Effectiveness Comparison
Net Present Value 2003-2012
$ millions

	NPV Benefit	NPV Cost	Net Benefit	Benefit/Cost Ratio
Maine Max	$143.6	$99.1	$44.5	1.45
Maine Min	$15.9	$11.3	$4.7	1.41
1 Mil	$75.1	$55.3	$19.8	1.36
New Even	$130.0	$90.8	$39.1	1.43

Program benefits continue over the life of the various efficiency measures and would continue to accrue even after the program ended. Chart 21 illustrates this, using the annual program costs and benefits from the Maine Max Case, and assuming the program would end after 2012. Program benefits continue to be realized for another decade, although at a decreasing rate as measures reach the end of their expected lives. This illustration is somewhat conservative, since it assumes that efficient measures would not be replaced at the end of their useful life. In reality, we should expect that some fraction of these measures will be replaced with technologies of equal (or greater) efficiency, and the resulting benefits would be extended.

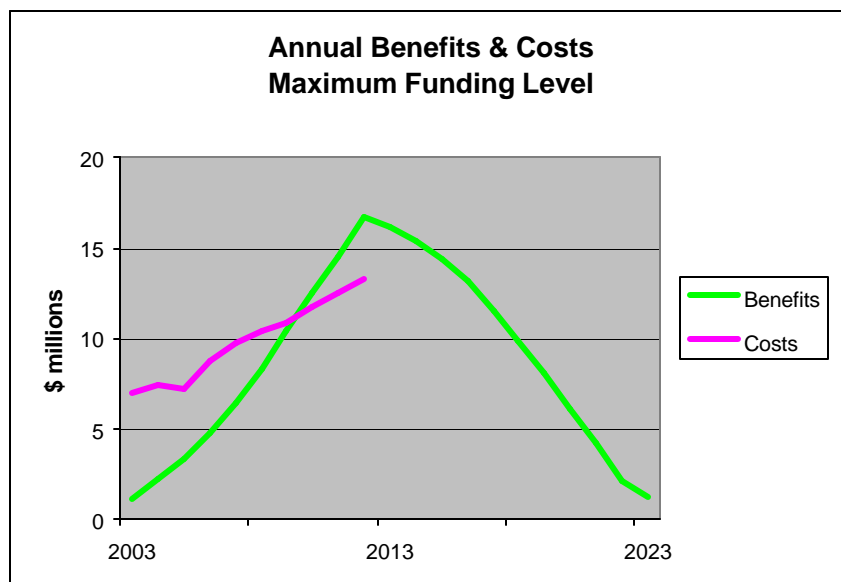**Annual Benefits & Costs**
Maximum Funding Level

Chart 21

Comments on Funding Level

Comments on funding levels were received from Madison Electric Works (MEW), CMP, BHE, MPS, Madison Paper, and the Public Advocate on behalf of the Maine Energy Efficiency Coalition.

MEW states that a single large customer accounts for over 8 times the consumption of the rest of their customers. This customer has previously installed energy saving equipment and implemented conservation measures, and therefore would be highly unlikely to benefit from the Commission's planned programs. MEW would therefore oppose any assessment that exceeds the statutory minimum.

CMP proposes a funding level of 1.0 mil/kWh, for an initial 3 years. CMP further states that the funding level should apply to all transmission and distribution utilities, since there is no evidence that there are any differences in the characteristics of service territories of the various T&D utilities in Maine.

BHE states that, over the last 5 years, it has spent about 0.6 mils/kWh on energy efficiency. It further states that no appropriate showing has been made to raise current funding levels and they should stay the same. BHE argues that energy efficiency investments are less attractive in their service territory than in the rest of the state, based on their review of Optimal's cost effectiveness analysis[12]. Finally, BHE raises the issue of how non-core sales affect the mil rate that core customers pay.

MPS states that they are currently being assessed at the minimum level, which they believe to be appropriate. However, they would consider an increase in the assessment if their customers get a proportional benefit.

Madison Paper expresses the view that the Commission must conduct a particularized inquiry for each T&D utility as to the appropriate level of total conservation expenditures, and therefore, assessments for that T&D utility. Madison Paper states that they have already invested in cost saving conservation measures, and further, would receive no system benefits because they take power exclusively over an MEW transmission line.

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[12] Response to CMP 01-52 Supplemental dated October 29, 2002.

The Public Advocate, on behalf of the MECC, cites the results of the Exeter and Optimal Studies and believes that the total available and achievable potential throughout Maine is several multiples of the potential that will be captured even under the maximum funding levels authorized by the legislature. MECC further states that this potential would be as a result of efforts in multiple markets that are targeted on multiple rate classes. These opportunities are distributed evenly and broadly throughout all service territories in Maine. MECC recommends that the Commission bring all utilities to the same level of maximum funding over a period of 3-6 years.

Discussion:

The views by some parties that funding should be set at 1 mil (CMP), or the minimum allowed (MEW, BHE and MPS) are overshadowed by the very large potential for cost effective energy savings in Maine, as detailed above. The achievable potential energy savings are several times that which could be achieved at the maximum funding level allowed by law. Funding at the minimum level would forgo over 800 million kWh of potential energy savings over the next decade, compared to that which could be achieved at the maximum funding level, while funding at the 1-mil level would forgo over 500 million kWh. As shown in Chart 20, above, the net benefits[13] that could be achieved at a maximum funding level over the next decade amount to almost $45 million, while a program

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[13] NPV benefits less NPV costs, over the period 2003-2012

funded at the minimum level would result in slightly less than $5 million and a 1 Mil program about $20 million of net benefits. This review clearly supports establishing the funding level at the maximum level allowed.

Both CMP and MECC point out that the potential for energy efficiency exists broadly throughout Maine, and funding assessments should apply to all T&D utilities. The results of the analyses submitted by OPA show that, while there may be some differences in individual end uses or market segments, overall, the potential for energy efficiency is relatively proportional across T&D service territories. MEW and Madison Paper make the argument that a large industry that has implemented some level of energy efficiency measures should be excluded from the funding assessment. This argument should be rejected for several reasons. Where energy efficiency programs have been available to industry, they have taken advantage of them, either directly or with the assistance of energy service companies and others. The past experiences of CMP and BHE are two local examples. Energy efficiency programs focus the attention of business and others on identifying and implementing efficiency opportunities. Further, efficiency technology is continually changing, and new opportunities for savings are being identified and developed. Finally, the Commission should no more exclude a large industry that claims to have installed energy efficient equipment from a funding calculation than a residential customer who claims to have installed compact fluorescent bulbs in all their light fixtures. The Act states that minimum funding assessments should be based on

the total transmission and distribution revenues of the T&D utility. This indicates that customer revenue or kWh should not be excluded from the assessment calculation simply because the customer takes service at transmission voltage.

This leads to a related issue raised by BHE, that of non-core customers and sales. A similar issue has been discussed at various conferences during this proceeding about CMP's largest customers. When CMP's rates were unbundled into separate transmission, distribution and stranded cost rates, all of CMP's conservation-related costs were allocated as a distribution cost. During these conferences, some have at least implicitly questioned whether CMP's transmission-level customers should be eligible for conservation programs because they do not pay distribution rates. As discussed above, the Act indicates that funding should be based on total T&D revenues, or, by implication, total T&D energy delivery should the Commission use kWh as the basis for assessment. This would include T&D revenue from, or kWh delivered to, non-core customers and transmission-level customers.

Further, the Act specifically directs that the Commission:

> *"To the greatest extent practicable, apportion remaining available funds among customer groups and geographic areas in a manner that allows all other customers to have reasonable opportunity to participate in one or more conservation programs."*

35-A M.R.S.A. § 3211-A(2)(B)(3). We interpret the Act as requiring all customers, whether transmission or distribution customers, core or non-core customers, to be eligible to participate in any appropriate programs developed by the Commission. Therefore, even assuming that all conservation-related expenses incurred by CMP are allocated to distribution customers and that rates paid by transmission-only customers do not include any conservation expenses,[14] all customer groups should be eligible to participate in some of the programs in the portfolio of conservation programs. The question of how the conservation assessment should be recovered in T&D rates, like all cost allocation questions, is a complex one. We recommend that the Commission establish the principle that the portfolio of conservation programs should be directed at all T&D customers, and defer to a rate proceeding or an ARP adjustment proceeding any issue regarding whether the cost allocation of conservation assessments for CMP, or any T&D utility, is inequitable and should be changed.

BHE's statement that energy efficiency investments are less attractive in their service territory than the rest of the state is based on a set of tables supplied by Optimal, in response to a data request[15]. Upon review of these tables and tracing back through the underlying Optimal and Exeter calculations, we can find no supportable difference in energy saving potential or cost, and believe it to be another error in the Exeter analysis.

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[14] We leave the statement as an assumption at this point, because we have not given interested persons the opportunity to contest the validity of the assumption.
[15] Response to CMP 01-52 Supplemental, dated October 29, 2002.

Dated: February 11, 2003   Respectfully submitted,

Philip C. Hastings, Director
Energy Efficiency Program
On Behalf of the Commission's
Energy Efficiency Team